



PROPERTY OF



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MANUAL OF OPERATION
FOR
MODEL 2000 PROGRAMMABLE
DIGITAL PRINTER

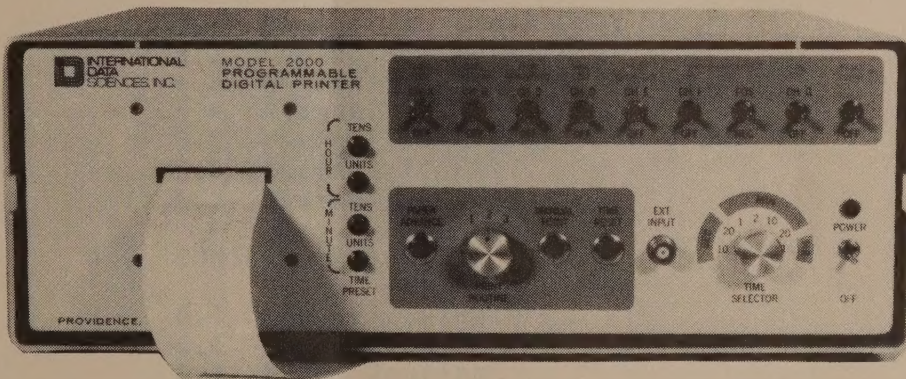
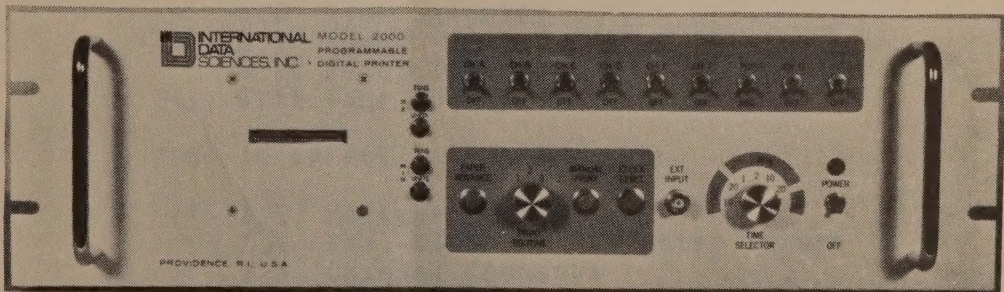


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RACK MOUNT

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1.0 INTRODUCTION

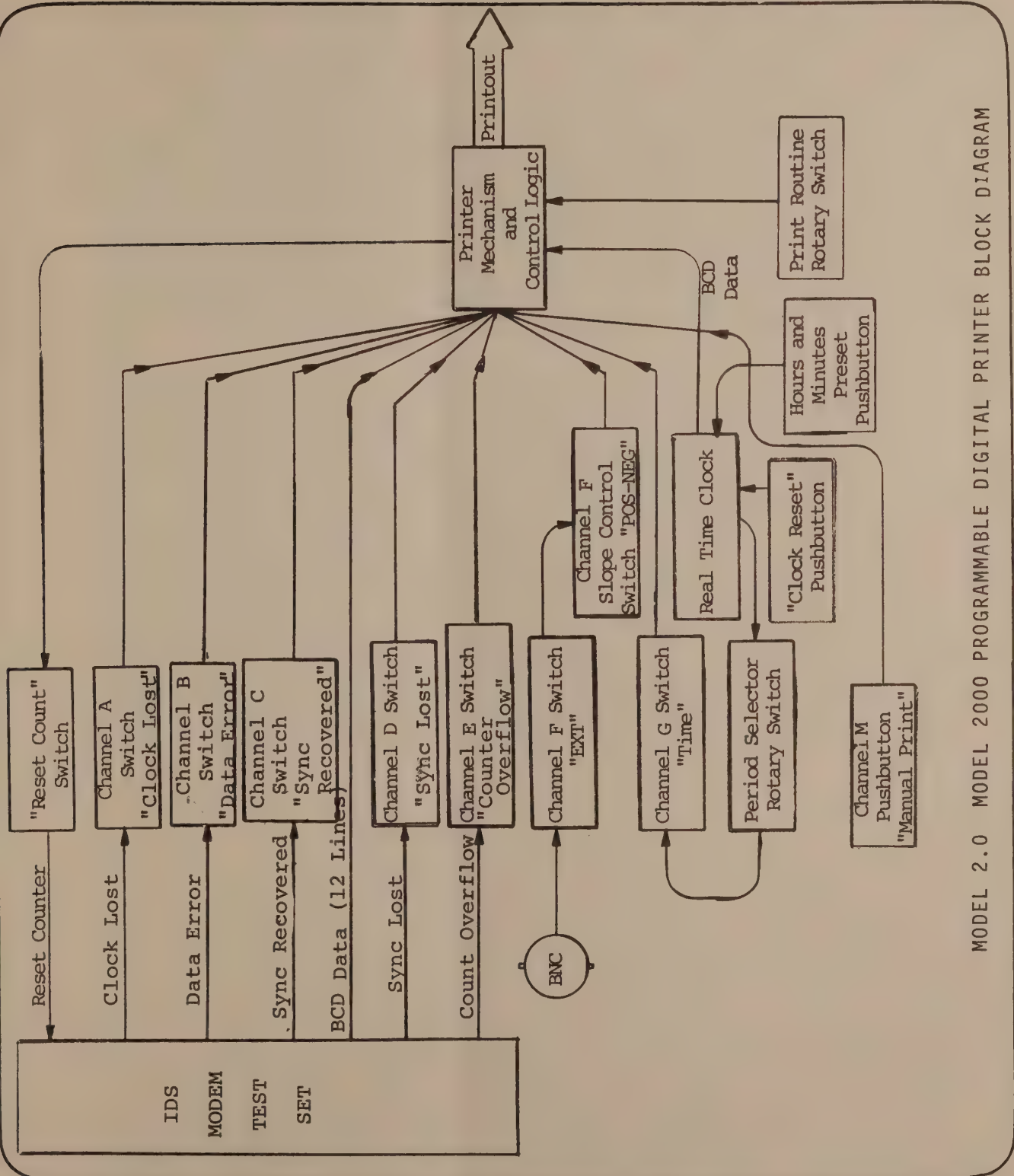
The Model 2000 Programmable Digital Printer is designed to operate with any IDS Modem Test Set to provide a permanent record of test results. The Model 2000 features a pre-settable real time clock, six selectable trigger channels, and seven selectable print periods. Printouts consist of the time that the event occurred, a channel identifier, and three digits of bit errors, block or character errors.

The Printer can be used "On Line" to obtain an unattended record of failures of critical signals such as Request to Send, Clear to Send, Data Terminal Ready, or any other EIA interface signal, or it can be used "Off Line" to obtain a record of data error, block or character errors, and failures of EIA interface signals.

The Printer is simple to operate. The operator starts the test by selecting the appropriate channels he wishes to record and turning on the power. Printouts are initiated whenever any of the selected events occur. Each trigger channel input signal is stored to allow printout of events that occur simultaneously.

2.0 BLOCK DIAGRAM

A block diagram for the IDS Model 2000 Programmable Digital Printer is shown in Figure 2.0. As illustrated output signals from the Modem Test Set include clock lost, data error, sync recovered, 12 lines of BCD data, sync lost, and counter overflow. The single output to the Modem Test Set is the reset counter signal which resets the counters in both the Modem Test Set and the Printer. All input and output signals are controlled by front panel toggle switches. Manual print, paper advance, and clock reset controls also are located on the front panel. A three-position rotary switch located on the front panel allows selection of three printout formats: identifier/data, identifier/data/time, and identifier data/time/space. Four pushbuttons allow the real time clock to be preset to hours and minutes.



MODEL 2.0 MODEL 2000 PROGRAMMABLE DIGITAL PRINTER BLOCK DIAGRAM

3.0 PRINTER OPERATION

Simplicity of operation is a hallmark of the Model 2000 Printer. In POWER-OFF position, the operator merely sets the appropriate switches to determine which events will trigger a print command. Once conditions have been set, he switches to POWER-ON which initializes the clock to time zero and energizes the printer for programmed operation. Hours and minutes may now be preset through convenient front-panel pushbuttons. Printouts of data sample, channel identifier, and time are initiated whenever any of the selected events occur. Figure 3.0 shows a typical series of printouts on tape.

The information printed during each print cycle consists of three digits of data (bit errors, blocks in error or characters in error, the elapsed real time in hours (2 digits) and minutes (2 digits) from start, and an alphabetic character identifying the channel that triggered the printout. Three print formats are selected by a rotary switch located on the front panel. The seven independent trigger channels are labeled Channel A through Channel G. For maximum flexibility in application, Channels A, B, and C are negative-edge-triggered channels, Channels D and E are positive-edge-triggered, and Channel F has a BNC input and a front panel control for either positive or negative slope trigger signals. Channel G is the periodic trigger channel. Its interval selection is controlled by a front-panel rotary switch with stops ranging from 10 seconds to one hour. Manual controls also included on the front panel are POWER ON/OFF, PAPER ADVANCE, MANUAL PRINT, CLOCK RESET, and CLOCK PRESET.

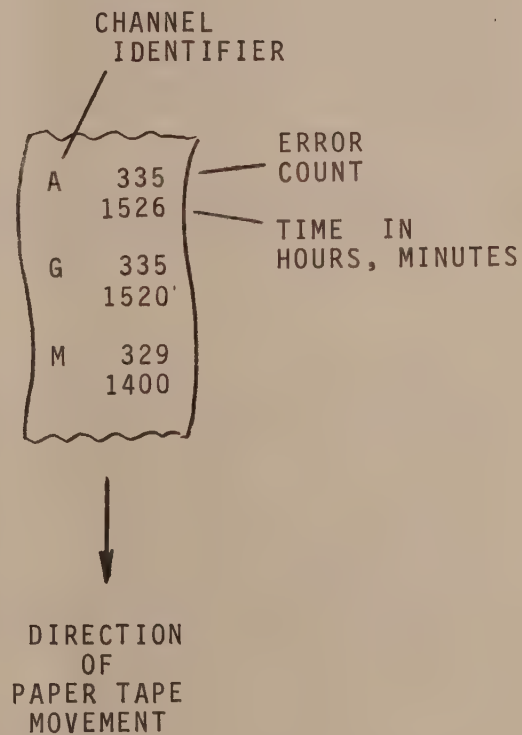


FIGURE 3.0 TYPICAL SEQUENCE OF PRINTOUTS ON TAPE

3.1 Range Rider Compatibility

The IDS Model 2000 Printer plugs directly into the "Range Rider" series of Pseudo-Noise Transmission Test Sets, and provides an automatic hard copy of all modes during the on-line testing of any digital data transmission system. In this application, Channels A through G are labeled CLOCK LOST, DATA ERROR, SYNC RECOVERED, SYNC LOST, COUNTER OVERFLOW, EXTERNAL, and TIME, respectively. The occurrence of any of these events during a test utilizing the Range Rider will trigger a complete print cycle consisting of time elapsed from start of test, error count at time of trigger, and an alpha character to tag the activated channel. In conjunction with channels F or G, the Range Rider error counter can be reset after each data sampling by means of the RESET COUNT switch.

WARNING: PRINTER MUST HAVE POWER ON WHEN PLUGGED INTO A RANGE RIDER TEST SET OR RANGE RIDER TEST SET WILL MALFUNCTION.

4.0 SPECIFICATIONS

POWER.....115 VAC, $\pm 10\%$, 60 Hz, 170 watts peak.
Internally protected with 2.5 Amp
Slow Blow fuse. May be strapped at
factory for 230 VAC, $\pm 10\%$, 50 Hz.

SIZE.....Desk Top: Width 16" (40.64 cm.)
Height 5 $\frac{1}{4}$ " (13.36cm.)
Depth 12" (30.48 cm.)
Rack Mount: Width 19" (48.26 cm.)
(Option) Height 5 $\frac{1}{4}$ " (13.36 cm.)
Depth 12" (30.48 cm.)

WEIGHT.....19 lbs. (8.62 kg.)

COLUMN SPACING.....0.25 inches (0.64 cm.) per column.

LINE SPACING.....5 lines per inch. (0.254 cm.)

CHARACTERS.....0.125 inches (0.318 cm.) high x 0.100 inches
(0.254 cm.) wide.

PAPER.....Pressure sensitive, 1 $\frac{11}{16}$ " (6.23 cm.) wide,
150' long (45.72 meters)

4.0 SPECIFICATIONS (continued)

PAPER WARNING.....Color indicator on the paper.

PRINTING SPEED.....2 lines per second.

DIGITAL CLOCK.....Synchronized to 60 Hz line frequency.

5.0 TRIGGER CHANNELS

5.1 Channel A, Clock Lost

A printout occurs whenever a loss of clock timing is detected by the Modem Test Set.

5.2 Channel B, Data Error

A printout occurs when (1) a bit error has been detected or (2) a block or character with one or more errors has been received.

5.3 Channel C, Sync Recovered

With this switch selected, a printout occurs each time the modem test set recovers bit synchronization. The error count printout will be zero since the modem test set resets the error count to zero upon re-synchronization.

5.4 Channel D, Sync Lost

With this switch selected, a printout occurs each time the modem test set detects a loss of bit synchronization. The error-count printout will be meaningless since errors will be detected due to the patterns being out of synchronization rather than legitimate bit errors.

5.5 Channel E, Counter Overflow

A printout occurs each time the three-digit error counter internal to the Modem Test Set has been exceeded.

5.6 Channel F, Ext.

This channel can be used for any signal not available through the interface connector. The printout can be triggered by the positive or negative edge of the signal as selected by the Channel F Positive-Negative slope control switch.

5.7 Channel G, Time

Provides periodic printouts selectable from 10 seconds to 1 hour in the following intervals: 10, 20, seconds; 1, 2, 10, 20 minutes; 1 hour.

6.0 CONSOLE SWITCHES

6.1 Channel Select

A switch for each of seven channels is provided such that any or all channels can initiate a print cycle.

6.2 Reset Count

A Toggle Switch. In the ON position, the Reset Count pulse is enabled for hand-shaking between the printer and the Range Rider modem test set. This switch will allow the "Range Rider's" error count to be reset simultaneously with the print cycle. Range Rider continues to detect and record error accumulation while the printer is in a print cycle. This switch operates only if either the Channel F or Channel G switches are ON.

6.3 Print Routine

This rotary switch controls the print format. Position 1: Data only; Position 2: Data and Time; Position 3: Data, Time, and Space (See Figure 6.3).

6.4 Channel F, Slope

A two-position toggle switch (POS/NEG). POS: Initiates printout on positive slope of input signal. NEG: Initiates printout on negative slope of input signal.

6.5 Clock Reset

This pushbutton resets the real time clock.

6.6 Manual Print

A pushbutton which initiates one complete print cycle. The channel identifier is the letter M.

				Identifier
M	0	0	0	Data
M	0	0	0	
M	0	0	0	
M	0	0	0	
M	0	0	0	

Print Format
#1

				Identifier
M	0	0	1	Data
	0	0	0	Time
M	0	0	1	(Left 2 Digits
	0	0	0	give hours, right
M	0	0	1	2 Digits give
	0	0	0	minutes.)
M	0	0	1	
	0	0	0	
M	0	0	1	
	0	0	0	

Print Format
#2

				Identifier
M	0	0	1	Data
	0	0	0	Time
				Space
M	0	0	1	
	0	0	0	
M	0	0	1	
	0	0	0	
M	0	0	1	
	0	0	0	
M	0	0	1	
	0	0	0	

Print Format
#3

Figure 6.3 Switch Selectable Print Routines

6.7 Paper Advance

Pushbutton which automatically advances paper when depressed.

6.8 Time Selector

A Rotary Switch allowing selection of an internally timed data sampling period. Print intervals are selectable from 10 seconds to 1 hour in the following intervals: 10, 20 seconds; 1, 2, 10, 20 minutes; 1 hour. The trigger timed by this selector switch is enabled only when Channel G is in the ON position. Printout occurs only if data has changed since the previous printout. This feature conserves paper.

6.9 Power

This switch energizes the unit and automatically resets the real time clock. A Lamp indicates when power is on.

6.10 Power Interlock

De-energizes unit when cover is lifted to change paper.

6.11 Time Preset Control

A time preset control feature has been designed into the Model 2000. This feature allows the real time clock, internal to the printer, to be preset to the time of day the test starts. It consists of four pushbutton switches located on the front panel and labeled: Tens (hour), Units (hour), Tens (min.), Units (min.).

Each time a switch is depressed and released it will advance the time counter one unit. The counter is connected such that it overflows from units (minutes) to tens (minutes) to units (hours) to tens (hours).

For example: To preset time to 12:45, the minutes "units" is depressed 5 times and the minutes "tens" is depressed 4 times. The hours "units" is depressed twice and the hours "tens" is depressed once.

7.0 INTERFACE

7.1 Voltage Levels

DTL/TTL compatible. High = 2.4 to 6 volts.
 Low = 0 to 0.4 volts.

7.2 Bit, Block or Character Errors

A serial input with logic "1" equal to a Low and logic "0" equal to a High.

7.3 Channel Commands

Input Signals. Channels A, B, C, and F (with its associated slope control switch in the NEG position) must change from a high to a low and remain low for more than 20 microseconds. Channels D and F (with its associated slope control switch in the POS position), must change from a low to a high and remain high for more than 20 microseconds. Channel F BNC accepts 0 volts or 5 volts inputs.

7.4 Reset Count

Output Signal. A 17 millisecond pulse changing from a High to a Low as soon as the contents of the three-digit internal counter is loaded into the print output buffer. This pulse is generated only if the Channel F or Channel G switches are ON.

7.5 Connector

Cinch Jones DB 25P or equivalent. Required mating connector Cinch Jones DB25S or equivalent.

7.6 Interface Pin Assignments

MODEL 2000

15	Data Input	1 Unit
14	Data Input	2 Units
12	Data Input	4 Units
13	Data Input	8 Units
10	Data Input	1 Ten
11	Data Input	2 Tens
8	Data Input	4 Tens
9	Data Input	8 Tens
6	Data Input	1 Hundred
7	Data Input	2 Hundred
5	Data Input	4 Hundred
4	Data Input	8 Hundred (Channel E Input)
1	(Not Used)	
23	(Not Used)	
18	(Not Used)	
20	(Not Used)	
3	Channel A	Input
2	Channel B	Input
19	Channel C	Input
24	Channel D	Input
16	(Not Used)	
	Channel F	Input (Front Panel BNC)
17	Reset Count	Output
22	(Not Used)	
25	(Not Used)	
21	Ground	

8.0 PAPER LOADING

The following is a step-by-step procedure for loading a new roll of paper into the Model 2000 Printer. Figure 8.0 illustrates the procedure.

8.1 Instructions

8.1.1 Lift printer cover exposing printer mechanism. Power will automatically be disconnected by the top cover power interlock switch.

8.1.2 Cut the end of the paper tape diagonally with scissors to insure a smooth starting edge.

8.1.3 Drop the paper roll into the printer mechanism and fold the end of the paper tape as shown in Figure 8.0-a.

8.1.4 Manually rotate the paper-advance rubber wheel as far as possible in the direction shown in Figure 8.0-b. Insert the paper end over the spacer rod and down to the guide plate as shown in Figure 8.0-b and maneuver the paper tape end to the point where the paper-advance rubber wheel meets the spring.

8.1.5 Manually rotate the paper-advance rubber wheel as far as it will go in the direction shown in Figure 8.0-c making sure that the paper is pulled forward toward and under the print wheels.

8.1.6 Close cover, energizing the unit. Push the paper-advance pushbutton on front panel until paper feeds through front-panel slot.

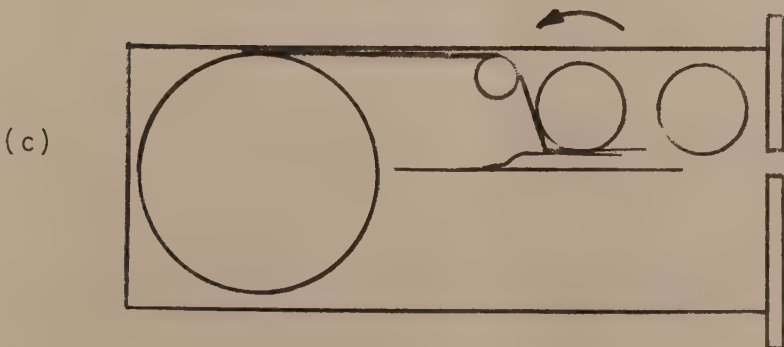
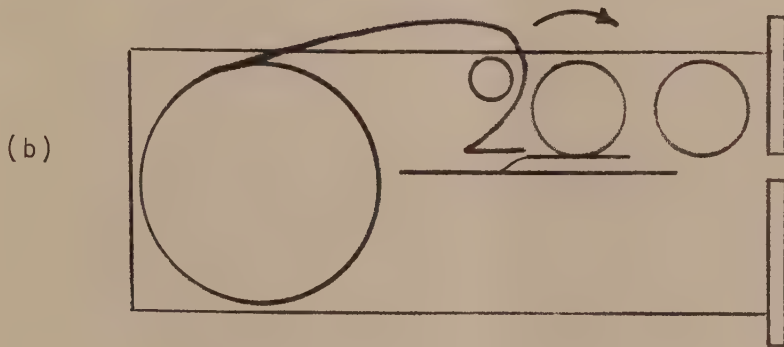
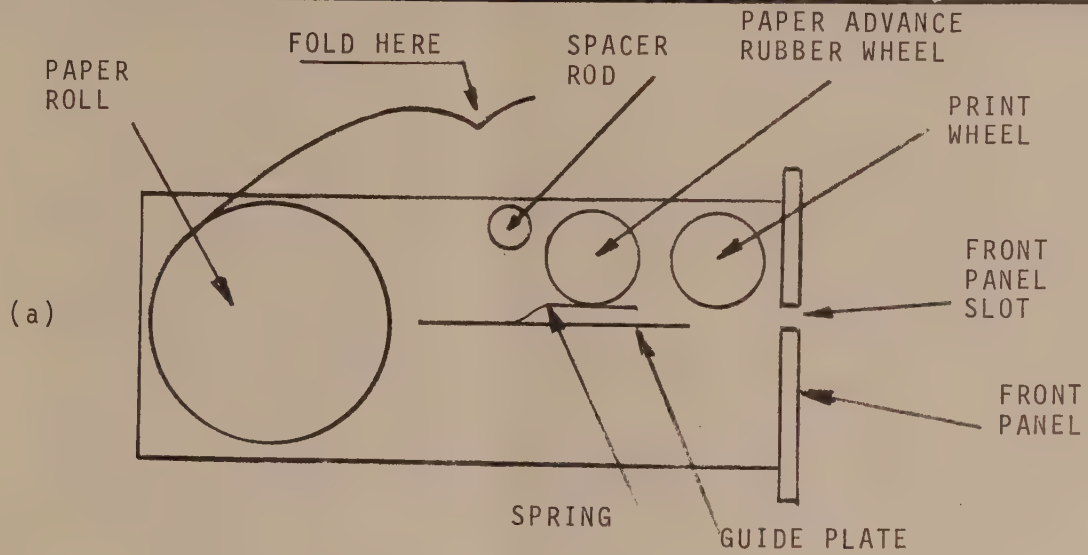


FIGURE 8.0
PAPER LOADING
INSTRUCTIONS

9.0 MAINTENANCE

The Model 2000 Programmable Digital Printer utilizes plug-in printed circuit boards to facilitate fault isolation and repair. Most faults can be isolated utilizing the front panel switches and I.D.S. Range Rider Modem Test Set. The unit can then be repaired merely by replacing suspect plug-in printed circuit boards or printer mechanisms. A plug-in printed circuit board card extender is supplied with each unit to facilitate the isolation of failures down to the component level if required, however, it is suggested that the factory be contacted before this is attempted. The main subsystems of the Model 2000 are shown in Figure 9.0. To the left of the unit is the printing mechanism and control logic subsystem. This subsystem is connected to the Model 2000 main logic sections via an edge connector located at the rear of the printer assembly.

The Main Logic Subsystem is mounted on three plug-in printed circuit boards labelled A1, A2, and A3.

9.1 Plug-In Logic Boards

9.1.1 Board A1

This board contains the logic for channels A, C, F, G, and the channel F slope switch control. It also contains the logic enabling the Range Rider Modem Test Set error counter to be reset after each printout under control of the RESET COUNT switch. The identifier channel data to printer is also located on the board.

9.1.2 Board A2

This board contains logic circuitry for channels B, D, and E and portions of the printing mechanism control interface. In addition, the Manual Print, Reset Count, and Print Routine switch functions are located on this board.

9.1.3 Board A3

This board contains the logic for the real time clock, the interface circuits for the printing mechanism, and the control logic for the Clock Reset pushbutton function.

9.1.4 Card Extender Board

This board is a card extender and may be utilized for troubleshooting boards A1, A2, and A3.

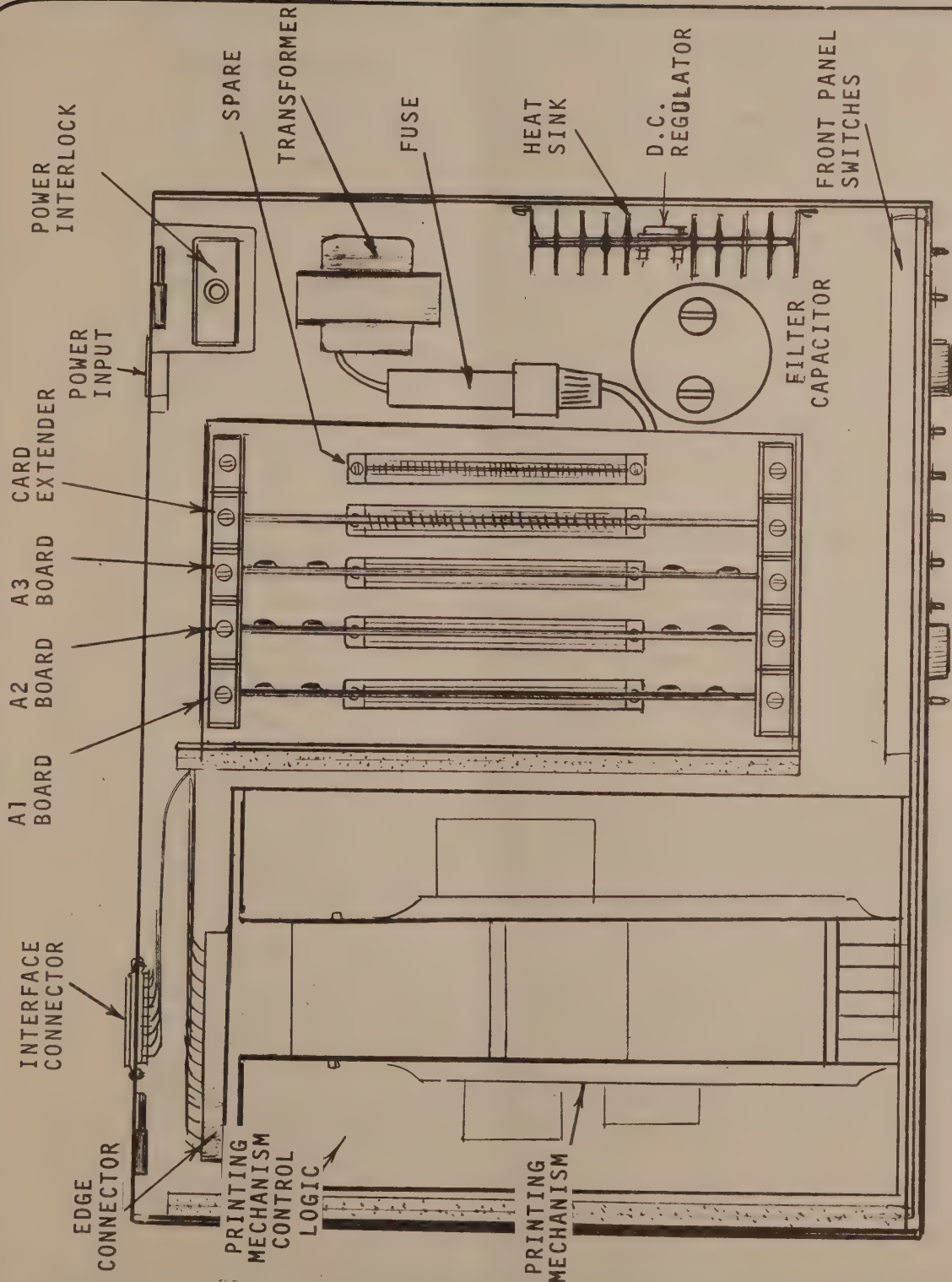


FIGURE 9.0 TOP VIEW OF MODEL 2000 INTERNAL LAYOUT

9.2 Test Procedures

1.
 - a) Place all toggle switches in the down position.
 - b) Set print routine switch to 1.
 - c) Set time selector switch to 10 seconds.
2. Connect Model 2000 to AC power source.
3. Set Power switch UP.
NOTE: Printer mechanism advances to its starting position.
4. Depress paper advance switch.
NOTE: Paper advances through front panel.
5. Depress manual print switch.
NOTE: Printer advances one print routine and stops automatically.
6. Set print routine switch to 2 and depress manual print switch.
NOTE: Printer advances two print routines and stops automatically.
7. Set print routine switch to 3 and depress manual print switch.
NOTE: Printer advances three print routines and stops automatically.
8.
 - a) Set print routine switch to 1.
 - b) Connect Model 1200 to any IDS Modem Test Set.NOTE: In the following discussion, an IDS Model 1310 TDM-Modem Test Set will be used to test the Model 2000 Printer. The Model 1310 is assumed to be in a self-test, loop-around mode with a pseudo-random pattern selected. While a Model 1310 is utilized in this test procedure, any IDS Modem Test Set may be used.
9. Using force error switch on the Model 1310, check all numbers 0-9 on units, ten, and hundred by inserting an error and then depressing manual print switch on the Model 2000 at each desired number.
NOTE: In all cases number on printer tape agrees with error count.

10. Depress and release break sync switch on Model 1310.
NOTE: Printer did not initiate a printout.
11. a) Set CH A switch on Model 2000 up.
b) Depress and release break sync switch on Model 1310.
NOTE: a) Printer initiates a print routine.
b) An "A" has been printed in the left hand column of Model 2000 tape.
12. a) Set CH A switch off.
b) Set CH B switch up.
c) Set force errors switch on Model 1310 up.
NOTE: a) A print routine is initiated each time an error occurs.
b) A "B" has been printed in the left hand column of Model 2000 tape.
13. a) Set CH B switch off.
b) Set CH C switch up.
c) Depress and release break sync switch on Model 1310.
NOTE: a) A print routine is initiated when the Model 1310 recovers sync.
b) A "C" has been printed in the left hand column of Model 2000 tape.
14. a) Set CH C switch off.
b) Set CH D switch up.
c) Depress and release break sync switch on Model 1310.
NOTE: a) A print routine is initiated when Model 1310 detects sync lost.
b) A "D" has been printed in the left hand column of Model 2000 tape.
15. a) Set CH D switch off.
b) Set CH E switch up.
c) Using force error switch on Model 1310, allow error count to reach overflow.
NOTE: a) A print routine is initiated when error count overflows.
b) An "E" has been printed in the left hand column of Model 2000 tape.
16. a) Set CH E switch off.
b) Set CH F switch up.
c) Connect negative going signal to EXT BNC.
NOTE: a) A print routine is initiated when input at BNC goes negative.
b) An "F" has been printed in the left hand column of Model 2000 tape.

17. Set slope switch to POS.

NOTE: A print routine is initiated.

18. a) Set reset count switch up.
b) Insert a random number of errors in Model 1310.
c) Set slope switch to Neg. then back to Pos.

NOTE: a) Printer initiates a print routine.
b) Error count in Model 1310 has been reset to 000.

19. a) Set CH F switch off.
b) Set slope switch to neg then back to pos.

NOTE: Printer does not initiate a print routine.

20. a) Set CH G switch up.
b) Force errors in Model 1310 at a rate greater than 1 every 10 seconds.

NOTE: Each 10 seconds a print routine is initiated and a "G" has been printed in the left hand column of Model 2000 tape.

Each time a print routine is initiated the Model 1310 error count is reset to 000.

21. a) Set print routine switch to 2.
b) Allow time print on paper tape to advance past at least one minute.
c) Depress and release reset clock switch.

NOTE: The next printout will be at time 0000.

22. Set time selector to each position and check for correct time interval printout.

NOTE: Check for correct hours and minutes printout.

9.3 Fault Analysis and Repair Procedure

Field service (or user service) of the Model 2000 is limited to replacement of any one or all of three printed circuit boards and replacement of the printing mechanism. Maintenance or component replacement beyond this level should only be accomplished at the factory. Unauthorized component replacement beyond that described herein may result in cancellation of any warranty agreements.

The following paragraphs describe faults and corrections by replacement of printed circuit boards A1, A2, A3, or printer mechanism. In cases where two or more replacements are suggested as corrections, the user should make replacements in the order they appear until the fault is corrected. If the suggested replacements do not correct the fault, the unit should be returned to the factory.

9.3.1 Fault Analysis and Repair Chart

CONDITION: Power switch ON. Channels A through G OFF. Reset count OFF.

<u>FAULT</u>	<u>CORRECTION</u>
1. Does not "paper advance."	Printing Mechanism
2. "Manual print" command does not function.	A2, A1, Printing Mechanism
3. "Print routine 1" is not correct.	A2
4. "Print routine 2" is not correct.	A2
5. "Print routine 3" is not correct.	A2
6. "Clock reset" does not function.	A3, A2
7. Clock does not printout in "print routine 2 or 3."	A2, A3
8. Clock printout is all zeros (after one minute of operation)	A2, A3
9. Incorrect elapsed time printout	A2, A3, Printing Mechanism

CONDITION: Model 1100, 1200, 1300, or 1310 "Range Rider" Test Set connected to the Model 2000. The test set must have "Power On" and be in the "Test" mode.
(Note: Be sure the printer cable is used to connect to the test set, not the data cable).

<u>FAULT</u>	<u>CORRECTION</u>
1. Channel A off, the test set loses clock and a printout occurs. (Clock lost by depressing "Break Sync" pushbutton in test set).	A1
2. Channel A on, the test set loses clock and no printout occurs (Clock lost by depressing "Break Sync" pushbutton on test set).	A1

<u>FAULT</u>	<u>CORRECTION</u>
3. Channel B off, the test set records a forced error and a printout occurs.	A2
4. Channel B on, the test set records a forced error and <u>no</u> printout occurs.	A2
5. Channel C off, and the "Break Sync" pushbutton is depressed. The test set recovers sync and a printout occurs.	A1
6. Channel C on, and the "Break Sync" pushbutton is depressed. The test set recovers sync and <u>no</u> printout occurs.	A2
7. Channel D off, and the "Break Sync" pushbutton is depressed. The test set recovers sync and a printout occurs.	A2
8. Channel D on, and the "Break Sync" pushbutton is depressed. The test set loses sync and <u>no</u> printout occurs.	A2
9. Channel E off, and the "Break Sync" pushbutton is depressed. The test set "Overrange" indicator goes on and a printout occurs each time the error count goes from 999 to 000.	A2
10. Channel E on, and the "Break Sync" pushbutton is depressed. The test set "Overrange" indicator goes on and <u>no</u> printout occurs.	A2
11. Any channel F faults including functions of "POS/NEG SLOPE" either in the ON or OFF position.	A1
12. Channel G on and no printout or printout at an incorrect interval.	A1, A3
13. Channel G off and printout occurs.	A1
14. Reset Count off, Channel F and G off, and reset of the test set display occurs.	A2

FAULT

CORRECTION

- | | |
|---|------------------------|
| 15. Reset Count up, Channel F or G on, Channel A thru E off, and reset of the test set display <u>does not</u> occur. | A1, A2 |
| 16. Incorrect test set display count is printing when Channels B, F, or G are on. Reset Count may be up or off. | A3, Printing Mechanism |

10.0 OPTIONS

10.1 Rack Mount

A rack mounting option is available which includes a slide-out mechanism to facilitate changing paper.

CALIBRATION AND REPAIR SERVICE

All units sold by International Data Sciences, Inc. are calibrated at the time of delivery. International Data Sciences, Inc. recommends a periodic calibration every six months thereafter performed by the Calibration Department at International Data Sciences, Inc. Contact IDS for the cost of each calibration. If the unit requires repairs that are not covered by the original warranty, then IDS will perform the repair at an hourly charge plus parts. Normal turn-around time for calibration is two weeks.

Equipment so calibrated will bear a gummed label on the rear panel identifying the serial number of unit calibrated; the date of calibration; the next recommended calibration date; and the in-plant calibrator identifier.

All units returned to IDS for calibration will be accepted only if transportation charges are prepaid. The purchaser is also responsible for all transportation charges incurred in returning the calibrated unit to the purchaser.

For fast service Mark IV or Airborne Air Freight are recommended. If time is not a problem, UPS is recommended. Return address should be clearly stated and should include a person to the attention of whom unit will be shipped.

Shipping cartons with proper foam packing are available from IDS. The carton will facilitate shipping the equipment to be calibrated with a maximum of protection.

WARRANTY

All International Data Sciences, Inc. instruments are warranted against defects in material, workmanship, and component failures for a period of ninety days and against defects in material and workmanship for a period of one year. All units returned to IDS under this warranty require prepaid transportation charges. The purchaser is also responsible for all transportation charges incurred in returning the repaired unit to the purchaser.

Instruments to be returned under this Warranty require prior authorization by an International Data Sciences, Inc. representative or by the service manager of International Data Sciences, Inc.

International Data Sciences, Inc. reserves the right to make changes in design at any time without incurring any obligation to install same on units previously purchased.

This Warranty is expressly in lieu of all other obligations or liabilities on the part of International Data Sciences, Inc., and International Data Sciences, Inc. neither assumes nor authorizes any person to assume for them any other liability in connection with the sales of International Data Sciences, Inc. instruments.



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